S. S. Leshchenko (AESC MSU). **About one type of barycenters for a finite set of probability measures.**

Let $\mathbb{E} = (\Omega, \mathcal{F}, (\mathsf{P}_\theta)_{\theta\in\Theta})$, $\Theta = \{1, 2, ..., N\}$ be a statistical experiment. Let R be a probability measure on $(\Omega, \mathcal{F})$ that dominates P_1, ..., P_N and p_1, ..., p_N — corresponding Radon-Nikodym derivatives.

Define a Markov kernel $\boldsymbol{P}$ from $(\Theta, 2^\Theta)$ to $(\Omega, \mathcal{F})$ by $\boldsymbol{P}(\theta, A) = \mathsf{P}_\theta(A)$, $\theta \in \Theta$, $A \in \mathcal{F}$. Let Let $\mathcal{K}$ be the class of all convex lower semicontinuous functions $f : \mathbb{R} \to \mathbb{R} \cup \{+\infty\}$ such that int dom $f = (0, +\infty)$.
Let π and $\overline{\pi}$ be two probability measures on Θ. Suppose that $\pi_i = \pi(\{i\}) > 0$ и $\overline{\pi}_i = \overline{\pi}(\{i\}) > 0$, $i = 1, 2, ..., N$. For the statistical experiment $\mathbb{E}$, a measure of informativity is proposed, constructed using f-divergence ($f \in \mathcal{K}$):

$$\mathscr{I}_{f,\pi,\overline{\pi}}(\mathsf{P}_1, ..., \mathsf{P}_N) = \inf_{\mathsf{Q}\in\mathscr{P}(\mathcal{F})} I_f(\pi \times \boldsymbol{P}, \overline{\pi} \times \mathsf{Q}). \tag{1}$$

Here $\mathscr{P}(\mathcal{F})$ is the set of all probability measures.
The solution of the problem (1) will be called the barycenter. We will be interested in the question of the existence of a barycenter. Using convex analysis methods, we formulate a dual problem and obtain a characterization of the barycenter through the solution of the dual problem. Let us formulate the main result.
Theorem. *The barycenter in the problem* (1) *exists and the dual problem has a solution. In addition, there is no duality gap and there is a characterization of the barycenter of the problem* (1) *through the solution of the dual problem.*
Note that if the distributions of π and $\overline{\pi}$ coincide, then the existence of a barycenter was proven in [1] by other methods, and the characterization of the barycenter of the problem (1) coincides with the characterization obtained in [1].

BIBLIOGRAPHY

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